TAPE 1, SIDE 1

Made by Douglas Perham and Erv Rasmussen at the New Almaden Museum, New Almaden, California, June, 1963

Wollensak Index	
1	Early wireless in the U.S.
43	Life story of Douglas Perham.
185	Cy Elwell and Federal Telegraph Co.
265	1912--De Forest's discovery in Palo Alto.
285	Discussion of early tubes.
324-608	Marconi case of the Perham collection: items 1 through 36.
609	Marconi case: items 37 to 69.
852	Letters from archives of Marconi Co.
893	Story of Mahlon Loomis who sent wireless signals in early 1860s.
973	Story of Dr. Charles Herrold told in detail by Perham.
149	Letters re Herrold equipment and long distance wireless telephone events. Also news clippings.
446-575	Interview with Terry Hansen, early student of Herrold.

(Continued on Side 2.)

ABSTRACT OF TAPE MADE BY DOUGLAS PERHAM AND ERV RASMUSSEN
June, 1963, at the New Almaden Museum, New Almaden

Tape 1, Side 1

Indicator

1 Early wireless in the U.S. 1898, troop transport coming from Phillipines sent message to station in the Cliff House, San Francisco. 1901, series of stations in Hawaiian Islands. 1901, Marconi's first U.S. station, Nantucket Island. 1905, Marconi station on Mt. Tamalpais.

43 Life story of Douglas Perham. Born in Duarte, Calif. in 1885. Father a teacher and headmaster. High school in Stockton. 1893, World's Fair in Chicago. Visited George Westinghouse and Nikola Tesla. Westinghouse started his collecting career with a lamp and socket. 1898, Perham in Palo Alto. Importing X-ray tubes from Germany. Crookes tube in collection built at Harrison Lamp Works, New Jersey for Thomas Edison. 1902, installed first X-ray on Pacific Coast in doctor's office in Palo Alto. Bought Cashel's Plumbing Company buildings at 913 Emerson Street. He and Joe Baker had spark sets--early hams. 1913 got his commercial license.

185 Story of Cy Elwell and Federal Telegraph Co. Elwell became interested in radio telephony after checking a McCarty radio telephone system for Henshaw Brothers, Oakland lawyers, about 1905. 1903, Valdemar Poulsen arc system. Elwell bought patent rights for U.S. use. David Starr Jordan subscribed $500 for project. 1909, Poulsen Wireless Telephone and Telegraph Co., first communications company in America to use wireless as a medium. Out of this came Wireless Development Co., Federal Telegraph Co., Mackay Radio, IT&T. Doug Perham first employee.

265 1912--De Forest's discovery. Van Etten, Logwood and de Forest, at 913 Emerson, discovered audion tube would oscillate, could be used as a generator of high frequency current. Description of circumstances.

285 Early tubes. Discussion of tubes by de Forest, Perham, Hyde, Moorehead, Cunningham, McCandless. De Forest's first triode was tubular--in the Perham collection.

MARCONI CASE

Indicator

324 Item 1. Marconi loose coupler. Used to receive signals from the Poulsen station.

Item 2. Electrose insulator. Famous, widely used. 1909 used by Dr. Herrold's station.

Item 3. Leyden jars. Crude but efficient condensers from Marconi station. Moskicki condensers an improvement.

Item 4. Stanley AC ammeter. Stanley Kelly Co. produced first polyphase motor after Tesla developed ac motor.

Items 6, 7. Thordarson transformers. About 1915. Started with apparatus for doctors, therapeutic machines. Still in business.

Item 9. 3 Murdock condenser sections. Murdock in Portland only source for amateurs. Prior to this had to make their own with glass plates, tin foil.

Item 10. Whitney Co. ammeter. Whitney one of early companies making ammeters.

Item 11. Transmitting vario coupler. Unknown origin.

Item 12. Marble base changeover switch. No comment.

Item 13. Baldwin headphones. Baldwin & Kolster combined to form Kolster-Baldwin Co. Kolster made radios in old green building, University and County Road, Palo Alto.

Item 16. Two mirror galvanometers. Made by Lord Kelvin in England. Used in early cable receivers.

Item 20. Mercury interrupter. Made in England by Max Levy (?) prior to Oct 12, 1899. Used in place of electrolytic interrupter--thicker spark. A complete description of this (by manufacturer?) is read by Perham.

Item 21. Roller Smith voltmeter. First meter manufacturer to bring down prices within amateur's pocketbook.

Item 22. Magnetic detector. Found by E. S. Pridham who founded Magnavox. Pridham worked with Peter

MARCONI CASE (cont'd)

Indicator

Jensen in Perham's laboratory in Palo Alto. This detector is very early, handmade.

Item 24. Marconi relay. From an elaborate Marconi receiver. First polarized relays to be built with great sensitivity. Used in Western Union and also wireless work.

Item 26. Western Electric tangent galvanometer. Built in great quantity by Western Electric for Western Union. Used extensively by all communications companies.

Item 28. Decade box. Made by Queen & Co., London. Very early.

560 Item 29. Edelman galvanometer. No comment.

Item 30. Spark coils. Originally designed for ignition systems on early single cylinder engines. Taken over by amateurs as source of spark power. McCarty, Herrold started out with spark coils.

Item 32. Marble base key by Picard Co. which later became Wireless Apparatus Co.

Item 33. Two magnetic relay keys. Description of Lafayette Station.

592 Item 36. Frahm frequency meter. German. Perham used one in ac lighting plant. Uses vibrating reed.

END OF TAPE 1, SIDE 1

ABSTRACT OF TAPE MADE BY DOUGLAS PERHAM AND ERV RASMUSSEN
June, 1963, at the New Almaden Museum, New Almaden

Tape 1, Side 1 (cont'd)

Indicator

609 Item 37. Marconi speaker. 40-50 years old. Amplified dot and dash signals.

Item 39. Chaffee quenched gap. Made by Telefunken.

Item 41. Leeds Northrup instruments. First American supplier of good devices.

Item 42. Russian condensers. From the Marconi Co.

Item 43. 366 Murdock condenser. Every ham had one.

665 Item 45. Miscellaneous carborundum detectors. Greenleaf W. Pickard was prolific producer, patents on many combinations.

Item 46. EI Company potentiometer. Shown in catalog of 1910. Hugo Gernsback, founder of EI Co, Electro-Importing Co. Also magazines: Electric [illegible] Writer Modern Electrics, Radio News, Electrical Experimenter.

710 Item 53. Electrolytic detectors. Discussion of component parts, manufacture.

Item 54. Miscellaneous crystal holders.

Item 55. Uncle Al's miracle receiver. Still in business in Oakland.

Item 59. Slaby-Arco coherer. Invented by German, Braun, adapted by Slaby-Arco. Used extensively by Marconi. Description of action.

Item 60. Steinite interference eliminator. 1920.

Item 61. Variable Marconi condenser. In brass housing.

789 Item 62. Kolster wavemeters. History of Kolster Co. Kolster radio compass manufactured by Federal Telegraph Co. Dr. Kolster first to build a parabolic reflector. First one here to experiment with short waves.

821 Item 69. One IP receiver and two SE 143 receivers.

Indicator

821 Item 69 (cont'd)

Built in World War I by many manufacturers for the Bureau of Steam Engineering. Designed by Pickard.

852 Letters between Marconi Co. and National Wireless Co. From archives of New Almaden Museum.

893 Story of Dr. Mahlon Loomis. From Perham archives. News story from New York Evening Mail. Mahlon Loomis a dentist who transmitted signals without wires in early 1860's.

973 Story of Dr. Charles Herrold. Told in detail by Perham. 1857-1948. San Jose High School, Stanford. 1909, radio school in San Jose. 1909, first broadcasting station--now KCBS.

and long distance radio telephone events.

149 Letters re Herrold equipment, / National Wireless Telephone and Telegraph Co., Marconi Co. All from Perham archives. Also newspaper clippings. 1913-1915.

446-575 Interview with Mr. Terry Hansen. Early student of Herrold. Ham, navy; commercial license in 1912. (Interview continued on side 2.)

END OF TAPE 1, SIDE 1

Transcriber's notes:

Tape 1, Side 1, item 3 in Marconi case: Perham gives the spelling as Moscicki; other sources give Moskicki.

Tape 1, Side 1, indicator 40, states de Forest stayed in Palo Alto until 1915. His autobiography and letters state he left in May, 1913.

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ABSTRACT OF TAPE MADE BY DOUGLAS PERHAM AND ERV RASMUSSEN
June, 1963, at the New Almaden Museum, New Almaden

Tape 1, Side 2

Wollensak Index

HERROLD CASE

1 Item 73. Leyden jars. 19 units. From old spark ship set, 1910.

Item 76. Stanley meters. Original meters from Herrold's Garden City Bank Bldg. station.

Item 77. Coupling unit. Conical helix. Pet theory of Dr. Herrold. "Smitty," a technician at University of Santa Clara, who died in 1962, built these helixes for Herrold.

45 Item 81. Herrold oscillator. A copy of Poulsen's arc. Perham explains operation of an arc. Filled atmosphere with "mush." The 30 kw Poulsen arc in museum collection could interfere with television within a radius of 1,000 miles, if used today. This Herrold oscillator borrowed by Marconi Co. then demonstrated it as its own in New York, and England.

consulting engineer with National Wireless,
148 Correspondence from archives. Between W.W. Hanscomb/and Golden, (?) attorney for National Radio Co, formerly National Wireless Telephone and Telegraph Co. To Wolverton from Hanscomb. To stockholders. Period from 1914 to 1920.

447 Item 85. Multi carbon microphone/~~head~~. Used to modulate arcs. Patented by Herrold.

Item 87. Lightning arrester. Made by Herrold.

Item 85. Marble base key. Used by Herrold.

Item 89. Two choppers. Used by Herrold. Operation described by Perham.

Item 92. 500 volt chopper.

515 Item 90. Loose coupler. Used from 1910-1925. Herrold furnished people in valley with crystal receiving sets so he would have audience.

Item 91. Tuning coil. Two sliders.

Item 93. Murdock telephones. On market about 1910.

Item 94, 95. Westen voltmeter, ammeter.

Item 96, 97. Tuning condensers, variable inductance reactors used at Herrold's station.

Wollensak Index

544 Item 98. Set of pictures and documents. An official inventory Herrold's material prepared for new company. Blue print of original oscillator. Photo of Emil Portal who started own broadcasting station in Los Altos, which was later under Colin B. Kennedy Co. Kennedy Co. making marine receivers at old Auzerais (?) house in 1919. Dr. Leonard Fuller, partner and financial backer. Saunders was Herrold's operator, living now in Manteca. Letter from Herrold and Portal to Hanscomb, March 3, 1916. News story in Pacific Radio News, January 19, 1921 on recently incorporated Colin B. Kennedy company. Kennedy, President; Harry J. Rathbun, Vice President; Nathan J. Bowers, Secretary; Emil Portal, Treasurer; and Dr. Leonard Fuller, Board member. Comments on these men.

646 DE FOREST STORY

Doug Perham reads highlights of de Forest's life from 1873 to 1957. Also reads an introduction he wrote for occasion honoring de Forest. Discussion of de Forest.

759 Item 100. 38 tubular audions. This collection covers de Forest's early work. Candlelabra bases. Reference to letter in archives from de Forest stating that "this is his original tube.".a cylindrical tube, candlelabra base. Discussion of various de Forest tubes.

Perforated metal grid/tubes made by Moorehead. Type R tubes. Moorehead and de Forest collaborated in manufacturing tubes. Friendly patent suits.

1916. De Forest shotgun suit against Moorehead, Elmer Cunningham and Hyde. Injunction denied.

Cunningham records in Perham's archives.

851 Item 102. Singertype audions. Medium powered transmitting tubes. Could be used in an oscillating device at audio frequencies.

Item 103. H. tube. 100 w transmitting tube used in mid '20s or early '30s. $18.00 from the De Forest Radio Company, New Jersey.

891 Item 104. Fleming valve. Rarest of tubes in collection. Discussion of Edison's work, Lippincott (patent attorney), Ben Cromey (?) Legal battles between Fleming and Marconi v.s. de Forest.

946 Item 105. 48 miscellaneous Marconi, de Forest and Moorehead tubes. Three-way deal. Story of Otis Moorehead, born 1893 in San Francisco. Died 1923. Patent suits. Letters from archives. Moorehead became largest manufacturer of vacuum tubes in U.S.--factory in S.F. 1919--de Forest, Marconi, Cunningham and Moorehead combined to make tubes. Sales, royalties, etc. RCA formed in mid 1920s. Brochure of Moorehead Company of 1919; Bankrupt in 1920.

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160 Comment on Harry Roome of Los Angeles. Sold vacuum tubes under name of oscillitron for about 2 years.

Item 107. Two de Forest detector units. Built by de Forest by hand at 913 Emerson Street. Used for experiments.

Item 108. De Forest navy detector. Sliding tuner designed by de Forest before he invented vacuum tube. Compared to "Responder" which is about $\frac{1}{4}$ size of detector. Responder very rare--Smithsonian recently bought one for $250. from Paul Giganti. The detector was prototype of the RJ4 and RJ5 which came along commercially.

Item 109. VT 20s. Made by de Forest first without a getter, six months later with one...1920.

215 Item 110. Edison lamp made by McCandless. Bamboo filament; showing the "Edison effect."

Item 111. 500 watt transmitter tube. Built by de Forest about 1918-1919.

Item 112. Transmitting tube. I kilowatt oscillion. Listed in old de Forest catalog of Lee de Forest, Incorporated, 451 Third Street, S.F. Prior to May, 1920. Describes the Singer tube with tungsten wires. (Catalog autographed by de Forest on December 15, 1956 when he visited Perham) Oscillion tubes described. Lee de Forest, Inc. was marketing organization on the West Coast for the De Forest Radio Co. of New Jersey.

309 Item 114. De Forest tube cans. De Forest sold receiving tubes in cans in mid-'20s. DL and DV series shipped in cans with screw tops. Early ones without labels.

Item 115. De Forest fan switch. Ingenious. Comments on lack of business sense.

Items 118, 119, 120. De Forest receivers, D7, D12, D17. D7 has a reflex crystal detector..description.
Item. 121. DT600 crystal set. "Everyman's radio."

Item. 122. Two dynatherm units. De Forest diathermy machines. Built in 1930s.

Item 123. De Forest variable condenser.

Item 124. De Forest receiver--D6. Not complete.

Item 117. 16 framed documents and photos. Feud on between Mrs. Cogswell, secretary of Palo Alto Historical Society and Dr. de Forest and Doug Perham re the sign in front of 913 Emerson Street.

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399 Sign states 913 is "the birthplace of electronics." First radio communication in Palo Alto took place at Elwell's home on Cowper Street and Middlefield Road--1551 Cowper. Elwell had a receiving station in Los Altos.

Discussion of de Forest and Fleming conflict; feud between de Forest and Armstrong; Ralph Heintz and patent suits; RCA tube stranglehold. Comments on Cyril Elwell, Terman, Chaskin.

536 Item 125. WE 212D. Large transmitting tube from KCBS.

544 End of Tape 1, Side 2.

ABSTRACT OF TAPE MADE BY DOUGLAS PERHAM AND ERV RASMUSSEN

July, 1963, at the New Almaden Museum, New Almaden

Tape 2, Side 1

Index

1 De Forest Case #2

Item 127. De Forest D10 receiver. Leatherette case. Loop is missing.

Item 129. Miscellaneous honeycomb coils. Can identify them as original de Forest coils by black fibre, diamond shaped piercings. Holmstrup wound first coils.

Item 130. Crystal detector. Vertical, single slide tuning coil made by de Forest himself in Palo Alto.

Item 133. De Forest variable condenser.

Item 134. Honeycomb coil holders. Copied by Murdock, Remler, etc.

Item 136. Grebe synchrophase receiver. Al Grebe headquarters in Long Island. Still very sensitive receiver. Grebe Co. went broke during early 30's...transition from battery to ac.

Item 137. RCA model 20 receiver. Built in mid 20's.

Item 138. Brass speaker case. Bronze housing. Popular since it looked like a microphone.

Item 139. RCA super heterodyne receiver. Called a portable--weighed 90 lbs.

Item 143. Bell Telephone 416 B tubes. Chinese copy of de Forest's tube, except for base. Used for cross-country relays.

86 Poulsen and Magnavox Cases

Item 159. Federal receiving variometer. Large because had to use large wire. Later used "liedsendrot," German wire mesh.

Item 160. Logwood tikker.

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108 Item 162. Tikker parts. Original Poulsen tikker was designed by Petersen in Denmark. Logwood improved it.

131 Logwood: Came to California from east about 1900. 1902--demonstrated McCarty's wireless telephone between Cyclers' Rest and Cliff House, San Francisco. After McCarty died, Elwell hired him as de Forest's assistant. De Forest took Logwood with him when he left Federal. Logwood given honorary title of Doctor.

157 Item 163. Mechanical amplifier. Description of parts and operation. Not too satisfactory.

171 De Forest's amplifier. Logwood took three P9 detectors (each with 1 de Forest tube) and hooked these together with telephone transformers. De Forest and Van Etten, also. Discovered the set-up would oscillate. De Forest prior to Armstrong in this. (Berliner and Edison invented the microphone at the same time.)

199 Item 165. Federal Relay Key. Invented by Schultz of Federal in Palo Alto.

Item 166. 3 arc units. Discussion of arc designed for therapeutic treatment. First arc unit brought from Denmark to Palo Alto in 1909. Cost $50.00. 100 watts. Elwell had Perham design and build a larger one--200 watts.

215 Federal Telegraph Co. Story--
Documents

January, 1908. News Clipping. Incorporation of Federal Wireless Telegraphy and Telephony Company in Arizona. Beach Thompson, W. W. Hopkins, George A. Pope, Howard P. Veider (?) of San Francisco.

239 Letter from Beach Thompson to H. P. Veider, April 18, 1913. Thompson in Washington, D. C. talking with ambassadors of South and Central America about establishing communications systems. Also Holland and Japan and China. Carlton, Vice-President of Western Union, sa ys they will act as collecting and disbursing agents in the U. S. Thompson also talked 1½ hours with Secretary of the Navy and his assistant, Mr. Roosevelt.

294 Two 1000 kw arcs built by Federal Telegraph in Palo Alto for the Japanese government. When the war was over, Japanese were unable to pay for them. One arc was given to Stanford

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University, where it was cut up with acetylene torch; the other given by Dr. Fuller to the University of California at Berkeley. Perham re-wound the coils to Dr. Lawrence's
301 specifications, and the arc was used in the first cyclotron.

Continuation of letter from Thompson, covering various plans with English, Marconi, our government. Reports on various tests made with Federal equipment.

385 Letter from communications officer at Mare Island, April 18, 1913, saying he could see no value to the U.S. Navy of radio telephone.

Advertisement of V. F. Hutton Co., 1908. Announces the first brokerage house in the world to use a wireless circuit...the Poulsen system.

News clipping, January 28, 1908. Yankee Doodle sung by wireless from Stockton to San Francisco.

399 News clippings. 1908. El Paso received messages from San Francisco, breaking overland record. Poulsen system given severe test: 2 messages from Stockton and Sacramento received simultaneously.

Two articles mentioned: March 30, 1915, paper delivered by Perham to Electric Club of Cedar Rapids, Iowa; article
412 by Dr. Lee de Forest from Electrical Review and Western Electrician, Vol 66, No. 8, February 20, 1915.

Picture of Poulsen as a young man, 1909, in front of Telegraphone Factory in Copenhagen, Denmark. Also shows Mrs. Elwell, Petersen.

Article by C. F. Elwell, read before the S. F. section of Institute of Electrical Engineers on March 25, 1910. Early transmission effected by oscillations generated by means of powerful sparks from condensers charged by means of large inductance coils in the primary circuit of which a suitable telegraph key was inserted. Paper traces improvements. Branley coherer, magnetic electrolytic detectors. Poulsen arc generates undamped waves. Elihu Thompson and Dudell. Undamped waves from 2000 up to 1 million per second. 30 kw arc--improved selectivity, duplex working, greater range, better daylight working, great increase in speed. Had to develop new type detector--the tikker. Description of arc generator parts and operation and also of Poulsen tikker.

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Essentials of wireless telephony system. Characteristics of Poulsen system. Good, clear speech over 180 miles in Denmark, 85 miles in California. Wireless telegraph: 180 miles, 300 words per minute; 600 miles, 150 words per minute.

659 Samples of tape made by Poulsen Telegraph during tests made between Stockton and Sacramento. Stockton and Sacramento stations installed by Perham about 1908.

677 Item 178. 23 miscellaneous documents and photos of Federal Telegraph Company.

Item 179. 5 kw loading coil--Federal.

Item 180. 5 Federal transmitting tubes.

690 Charles Litton Story

Stanford graduate--in 3 years. Experimental lab in Redwood City. Avid amateur. Followed work of de Forest. Made his own tubes, later made tubes for Federal Telegraph. Developed glass lathe and the vertical sealer. "Housekeeper" seal between glass and metal. During war built both glass-making machinery and tubes. After war, sold tube-making business, retained tool making business. Went to Grass Valley where now has lab, factory, home. Litton Industries formed for tube manufacturing.

Magnavox Story

745 Peter Jensen, brought from Poulsen Company in Denmark, 1909, by Elwell, to establish stations at Stockton and Sacramento. Experimented in Federal lab at night with E. L. Pridham on a speaker. Left Federal and went to Santa Rosa, where Jensen and Pridham formed Magnavox Co. Developed the moving coil loudspeaker. In mid twenties put out a series of vacuum tubes to work around other patents. Jensen died October 25, 1961, age 75. January, 1962 Radio Electronics story on Jensen. Called world's first disk jockey; played records in early 1900's for men at sea. After working with Pridham, they both came to Oakland, where Jensen had a loudspeaker factory and founded Jensen Industries.

836 Francis P. Farquhar described by Perham. The first accountant hired by Federal Telegraph Co. With them from September 1911 to May, 1912. Later with his his own firm in San Francisco. Compiled a monograph on the Federal Telegraph Company, dated November 15, 1956, now in Perham archives. Consists of a preface by Farquhar and four articles. Three

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of these are read on the tape by Perham. The fourth, missing at the moment, deals with Marconi. The three articles are as follows:

894 1) Circular issued by Poulsen Wireless Corporation, 1004 Merchants Exchange Building, February 15, 1911. Describes organization of the company, trustees, board of directors, stock, capitalization, state of the company's stations and patent rights. States that Valdemar Poulsen is now sending 245 words a minute over 900 miles of land. The Poulsen Wireless Corporation able to send messages 750 miles over land or water, day or night. Poulsen in Denmark now hears the human voice clearly over 420 miles. The Poulsen Wireless Corporation in Palo Alto has sent 300 words a minute from San Francisco to Stockton. Conversations held between these points and also Sacramento by wireless telephone. Company plans on 18 stations in near future. Estimates future earnings at $2,400,000 per annum with $1,250,000 net profit.

19 2) History of Poulsen Wireless Corporation. (Author unknown, but published by the Corporation.) 1909-1912. Tells of Elwell securing the patents of Poulsen and Petersen about 1909. Poulsen Wireless Telegraph and Telephone Company's first officers: Elwell, Prof. C. D. Marks of Stanford, R.W. Barrett, J. G. Robesmith, Valdemar Poulsen. Organized on January or February of 1910. $5 million capitalization. Inadequate financial support. Reorganized as Poulsen Wireless Corporation by Beach Thompson and others. Details of the transaction. Wireless Development Corporation the operating company, Poulsen Wireless the holding company. Wireless Development Co. was later changed to Federal Telegraph Co. 1911-1912: expansion of stations to compete with Western Union and Postal Telegraph. De Forest hired to do research. Also Christiansen, a Dane, did research on a rapid sending device. 1912--Beach Thompson negotiations with Publishers Press Co. for stations in all large cities west of the Mississippi. Elwell severed his connection with company in latter half of 1912.

254 3) Circular issued by Poulsen Wireless Corporation and Federal Telegraph and Telephone Company, 1911. Describes stock, patent rights. Hopkins, Meyer, Thompson, trustees. Federal Telegraph Co., strictly an operating company, can turn out the complete equipment for a station in 5 days. Features of the Poulsen or Federal system: 100-300 words per minute; duplex sending and receiving; selectability; privacy; non-interference; reliability; speed; flexibility; capacity. Lists directors, including Spreckles.

424 Article "Telegraphy, Waves without Wires," written by H. P. Veider in the P.G. & E. Co. magazine, 1912. Compares Poulsen system with spark systems. Discusses damped and undamped waves. Mentions conversations between San Francisco and Stockton (100 miles apart) were heard in Los Angeles, almost 500 miles away. Possibilities of the Poulsen arc ganerator

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being used by medical profession in applying heat or antiseptics internally. Poulsen visited doctors in Vienna. (This article is continued on Tape 2, Side 2.)

End of Tape 2, Side 1

ABSTRACT OF TAPE MADE BY DOUGLAS PERHAM AND ERV RASMUSSEN
July, 1963, at the New Almaden Museum, New Almaden

Tape 2, Side 2

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1-41 Conclusion of article, "Telegraphy, Waves without Wires," written by H.P. Veider, read by Perham. Describes in detail Poulsen equipment, San Francisco and San Bruno Point stations. Largest antenna in the world.

42 Items 183-186. Kennedy receivers. Kennedy made fine, long wave receivers, 1920s in Los Altos. Dr. Leonard F. Fuller financed the Colin B. Kennedy Co. Built audio frequency amplifiers in 1921.

Item 187. Kolster receiver, made for federal government in Palo Alto (with P as suffix to serial number) and in Salt Lake City.

62 Paper from archives on Poulsen Telegraph Co. Dated Jan 18, 1919. Capitalized at $25,000,000. U.S. Navy bought Poulsen stations and rights for $1,600,000. Stock disposal discussed.

78 Items in Federal case--miscellaneous. Receivers, speakers.

Item 158. Federal call box. Very rare. Federal placed these beside Western Union call boxes in downtown area of San Francisco. By twisting a key, a coded message was sent and a Federal Telegraph boy would come to get your telegraph.

Item 194. Infradyne receiver.

Item 206. GE battery charger.

Item 207. Wagner battery charger. Vibrating, mechanical type.

123 X-ray tube collection. Perham's first interest in 1898. Imported from Germany, then made his own. One (in collection) with wooden base, made by Thos. Edison in Harrison Lamp Works in New Jersey. Perham installed this in doctor's office in Palo Alto in 1902, first X-ray in the area.

137 Paul Seiler Electric Works. Pioneer electrical contractor on lower Market Street, S.F. Repaired tubes; sold telegraph instruments, batteries, manufactured telephones, galvanometers. Young experimenters bought supplies from him. Perham worked for him. Active in wireless in 1898, out of business by 1910. University of California has some of his galvonometers. Some of his phones in Perham's phone collection.

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165 Item 212. Fluoroscopes. About 1900. One used with Edison's tube in doctor's office in Palo Alto. Discussion of source of energy for this--static machines, very high voltage, could throw a 24" spark.

182 Item 213. Coolidge transformer. Furnished light or heating element of X-ray tube.

186 Item 214. Ritter Dental X-ray unit. Became obsolete in 1915, as exceedingly dangerous. Discussion of dangers of early machines, burns and injuries due to X-rays. Dr. Arthur Erskine, first international president of the radiographers.
231 Work done for him by Perham.

235 RALPH M. HEINTZ INTERVIEWED BY ERV RASMUSSEN

Introduction: Heintz an amateur radio operator since 1906. Believed to be first man to receive a radio signal from an airplane, 1910, at Tanforan race track. 1921, graduated from Stanford, built radio equipment on commercial basis. Built the 100 watt transmitter with which Clifford Dow made first amateur contact between Hawaii and Mainland. Discussion of "firsts" for Signal Corps, Merchant Marine, police cars, submarines, airliners, Byrd expedition to Antarctic. Heintz exhibit due to his generosity.

255 Interview: 1892--born in St. Louis, Missouri. 1902--moved to Horsetown, California. 1905--moved to San Francisco. 1906--earthquake. Description of this. 1906--moved to Berkeley. Started wireless with his own spark coil, through help of Arthur Heim of Alameda. Laird, Leonard Fuller also early hams. Bay Counties Wireless, 1909-1912--amateur wireless club. Discussion of some early members. 1913--graduated from Lick High School. 1913--UC at Berkeley. 1917--in Signal Corps, overseas, flying Hanley Paige bombers, at night, working in lab in daytime, with British. Worked with Robinson, inventor of cross loop direction finding system for aircraft. Worked at Farnborough.

394 1920--graduated from Stanford in engineering/chemistry. 1920--Standard Oil Company. 1921--"Ralph M. Heintz, Scientific Instruments," at 606 Mission Street. Moorehead Laboratories at 638-640. Mission Street. Also Atlantic and Pacific and the Colin B. Kennedy Companies. De Forest was with the Atlantic and Pacific Company, had an amateur radio telephone, an OT 10. Heintz knew de Forest and Moorehead well. Earl Borsch discussed.

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452 1922--partnership formed with brother-in-law, Heintz and Kohlmoos, 606 Mission Street. Built one of first broadcasting stations in Mexico, in Mazatlan. De Forest built one in Berkeley; KROW, KJBS discussed, both built by Heintz.

487 Wireless Specialty Apparatus Co. in Grant Building, at 5th and Market Streets. Headed by Earl Ennis, later a radio columnist for the Chronicle. Equipped a Wright airplane with a transmitter in 1910 at Tanforan.

500 1907. Early wireless phones--McCarty's, American Wireless Telephone Company, operated by Cohen and Dwyer. Description of methods used.

519 Attempt to send voice transmission to an airplane flying. Description of apparatus used. Madame Tetrazzini was asked to sing into the horn. When she learned that a man in an airplane was supposed to hear her, she refused to sing, saying it must be witchcraft.

539 Discussion of McCarty's spark gap system. Had a continuous whine when he was not talking. May have been one of the earliest in the U.S. Herrold came later. First really successful CW phone was the Poulsen arc brought in by Cy Elwell.

560 1920--Heintz left 606 Mission. Bought out brother-in-law. Took in Jack Kauffman.

1923-1928. Heintz at 219 Atoma Street, S.F. 1929--built a building in South S.F. Robert Dollar Steamship Company bought control of Heintz company in 1929. Heintz made transoceanic equipment for 168 ships. Communication division of Heintz and Kauffman later became Globe Wireless, later American Cable and Radio, MacKay Radio and finally part of IT&T.

592 Patent on grid, so had to make a three element tube without the grid: birth of the gammatron. Discussion of breaking patent monopolies. Gamma plate. Built 1 kw transmitters.

611 On Europe trip Heintz found out about other three element oscillators: Sinding-Larsen in Norway, Robert Goddard in U.S. and Vrieland(?) all had made the three-element tube "work."

622 RCA sued Heintz's company for patent infringement. After Heintz's evidence, withdrew suit, licensed Dollar Co. on same basis as GE and others, about 1934-35.

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659 Story of Bill Eitel and Jack McCullough. Eitel, drove a grocery wagon, was a radio ham in Los Gatos, came to work for Heintz. McCullough came a bit later from a job selling Stutz automobiles. The three of them started making tubes, blew their own. 1934--Eimac founded, in an old store building. Heintz and Kauffman were first to use tantalum as a plate material as a getter, since use of getters was patented.

707 1937-1939. Heintz joined Bendix for project: use of polyphase high frequency power in aircraft. Heintz met Bill Jack at Bendix. Formed a company, Jack and Heintz, in Palo Alto at old hammer factory on Middlefield Road. Had difficulty with labor racketeers. Moved the company to Cleveland. Kaar Engineering now in the Jack and Heintz buildings.

773 Discussion present single side band communication systems. Use of electrolytic detector in early days. Comparison with Fleming valve and first de Forest tubes.

842 Item 1. H & K portable generator. Known as the "300." Part of polyphase equipment developed for aircraft. Two separate sets of windings, could be used single or polyphase. 300-400 watts, 360 cycle. Similar generator used by explorers John Henry Neer, Sir Hubert Williams at North Pole, Lincoln Ellsworth, Byrd.

This particular generator: Clyde de Vinna, chief cameraman at Metro Goldwyn Mayer, a ham operator. Bought gas engine generator, crystal controls transmitter, receiving equipment from Heintz. Maintained communication with Hollywood while filming "Trader Horn" in middle of Lake Victoria, Africa, "in one hop."

900 Other early hams: Colonel Foster in Carmel; Cliff Dow in Samoa; Lawrence Mart on Catalina Island. Equipment used.

954 Patent suit discussion: RCA impressed with tubes made by Heintz which were duplicates of non-de Forest tubes of other inventors. 34 years of monopoly--17 years under Armstrong patent, 17 years under de Forest patent.

35 Farnsworth's cold cathode tube, used as an oscillator. Traffic between San Francisco and Manila. A key invention, the basis of his electron multiplier.

57 End of Heintz Interview

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58 Item 241. 30 kw arc. Built at Federal Telegraph Co in Palo Alto in 1930. Designed by Dr. Leonard Fuller. Vertical arc, cast iron base. 600 volts dc. Also build 1000 kw arcs, driven at 600 volts. Used motor generator sets from street railway. 1930--experiments with 1000 kw arcs. Chinese government ordered them, but could not pay. One given to Stanford, where it was cut up and sold to junk man, during war. Other given to U.C. at Berkeley. Perham rewound the fields to Dr. Lawrence's specifications for the first cyclotron. Dr. Fuller made the arrangements.

152 Item 242. Federal antenna coupler. Book type, used on a ship.

180 Item 243. Detuning inductance for tuning. Frequency shift device.

Item 244. 8 large insulators from Mackay station.

256 Item 248. Mackay phaseometer unit . Built by Dr. Fuller. Nameplate says Newark, N.J., but made in Palo Alto. Main office was in New Jersey in 1930. 1932--Federal moved all operations to N.J. This was when the large arcs were given away--weighed 60 tons.

July 3, 1963. Continuation of Erv Rasmussen and Douglas Perham

282 Item 247. General Radio condenser.

Item 248. GR inductor. General Radio one of early companies, still in business. Pie wound coils; using wood as dialectric. GR variometer (item 265) one of their first pieces of apparatus. Typed label.

328 Item 250. 1000 cycle oscillator. By GR.

Item 252. GR wavemeter. First wavemeter within the amateur's means. GR also made crystal exciter units.

Item 256. 28 miscellaneous audio transformers. 1921--everyone building his own. E.S. Pridham designed an rf transformer with an iron core. Elwell criticized this; Pridham quit and went into the Magnavox Co.

386 1921-22. Radio broadcasting became popular. Couldn't buy a receiving set, but had to build your own or have someone build it for you. People stayed up most of the night, thrilled to hear WEAF in New York. 1925-27. Built 10 and 12 tube superheterodynes. Later, Atwater Kent and Paul Crosley, who

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started by making parts, began building full receiving sets.

413 Item 258. Crosley 62 receiver.

265a. General Radio large transmitting insulators. Used by Federal Telegraph Co. to support inductances and as lead in insulators, at Palo Alto station.

Item 269. 9 photos and documents. Dr. Fuller, Federal factory.

478 END OF TAPE 2, SIDE 2